语法基础 第三讲

$while$循环

```
#include <iostream>

using namespace std;

int main()
{
    int i = 0;
    while (i < 10)
    {
        cout << i << endl;
        i ++ ;
    }

    return 0;
}
```

求斐波那契数列的第n项。$f(1)=1, f(2)=1, f(3)=2, f(n)=f(n-1)+f(n-2)$

```
#include <iostream>

using namespace std;

int main()
{
    int n;
    cin >> n;

    int a = 1, b = 1, i = 1;
    while (i < n)
    {
        int c = a + b;
        a = b;
        b = c;
        i ++ ;
    }

    cout << a << endl;

    return 0;
}
```

死循环就是永远出不了循环，避免写出这样的代码

$do\ while$循环

$do\ while$语句与$while$语句非常相似。唯一的区别是，$do\ while$语句限制性循环体后检查条件。不管条件的值如何，我们都要至少执行一次循环

```cpp
#include <iostream>

using namespace std;

int main()
{
    int x = 1;
    while (x < 1)
    {
        cout << "x!" << endl;
        x ++ ;
    }

    int y = 1;
    do
    {
        cout << "y!" << endl;
    } while (y < 1);

    return 0;
}
```

for循环

```cpp
#include <iostream>

using namespace std;

int main()
{
    for (int i = 0; i < 10; i ++ )
    {
        cout << i << endl;
    }

    return 0;
}
```

例如求$1 * 10 + 2 * 9 + 3 * 8 + 4 * 7 + 5 * 6$

```cpp
#include <iostream>

using namespace std;

int main()
{
    int sum = 0;
    for (int i = 1, j = 10; i < j; i ++, j -- )
    {
        sum += i * j;
    }

    cout << sum << endl;
```

```
    return 0;
}
```

跳转语句

break

可以提前从循环中退出，一般与if语句搭配

```
#include <iostream>

using namespace std;

int main()
{
    int n;
    cin >> n;

    bool is_prime = true;
    for (int i = 2; i < n; i ++ )
        if (n % i == 0)
        {
            is_prime = false;
            break;
        }

    if (is_prime) cout << "yes" << endl;
    else cout << "no" << endl;

    return 0;
}
```

continue

可以直接跳到当前循环体的结尾。作用与if语句类似。

```
#include <iostream>

using namespace std;

int main()
{
    int sum = 0;

    for (int i = 1; i <= 100; i ++ )
    {
        if (i % 2 == 1) continue;
        sum += i;
    }

    cout << sum << endl;

    return 0;
```

```
}
```

多层循环

```
#include <iostream>

using namespace std;

int main()
{
    for (int i = 0, k = 1; i < 10; i ++ )
    {
        for (int j = 0; j < 10; j ++, k ++ )
        {
            cout << k << ' ';
        }
        cout << endl;
    }

    return 0;
}
```